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**SPLICE FOR A HEAT SHRINKABLE LABEL**

This is a continuation of co-pending application Serial No. 09/064,258, filed April, 23, 1998, now abandoned.

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**Field of the Invention**

Heat shrinkable labels are commonly used for packaging and containers, e.g., soda bottles and other round containers. The labels are typically printed end to end on an elongated web which is wound on a roll or spool. One edge of the web is first glued on to the side wall of the container and then the label is wrapped around the circumference of the container. The label is then cut from the roll and the resulting edge is glued on to the container such that the two edges overlap. A sufficient amount of slack is provided in the label to accommodate the heat shrink qualities of the material. When heat is applied, the label material shrinks and conforms to the surface contours of the container. An example of such a labeling operation is identified in Hoffmann U.S. Pat. No. 4,406,721, which is herein incorporated by reference.

It is desirable to operate the labeling machine on a continuous basis. For this reason, a new supply of labels must be presented after the end of each roll. Typically, the end of one roll of labels is automatically spliced to the beginning of a second or following roll, creating a continuous web.

In the past, the splice material has been applied to the outside of the label web, over the printing on the label. The splice is brightly colored so as to stand out on the container as it is conveyed towards the final packaging equipment. A quality control person is required to monitor the labeled containers to visually locate containers that include a spliced label and remove those containers from the line prior to packaging and shipment to a customer. The splices have to be placed on the outside of the label so that the quality control person can see the splice on

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the label. If the splice were placed under the label, the coloring of the label could obscure the splice, resulting in a spliced label being shipped.

Since the labeled containers are usually fed on a conveyor to a packaging location, there is sometimes a tendency for the product to turn or spin around on the conveyor such that the splice is not facing the quality control person as the container passes. In these situations, a container with a spliced label may be missed and the container shipped to a customer. For this purpose, a fallout flag is often attached to the label at the splice so that the container having the splice is more easily identifiable for removal purposes. Even with this added precaution, containers with spliced labels are shipped much of the time.

The prior spliced labels are considered unacceptable for most applications because the labels tend to cover a portion of the text or marketing materials on the label. The splices also disfigure the label due to the contrasting brightly colored splice. Moreover, conventional splices are typically made from materials which are non-shrinkable. As such, when the spliced label is heat-shrunk onto a container, the splice distorts the label.

### **Summary of the Invention**

The present invention relates to a structure for joining abutting ends of two webs of elongated heat shrinkable label material. The two webs are aligned end to end and a splice composed of a heat shrinkable material adheres the two ends together, thereby connecting the two webs to form a single continuous web. When the spliced label is attached to and wrapped around a container, the splice shrinks along with the label without distorting, splitting or causing excess fatigue within the label material. In addition, preferably, the splice material is clear or transparent so that the printing on the label is not defaced. Further, the splice may be applied to the inside surfaces of the two abutting label webs; thus, when the label is heat shrunk onto the container, the splice is positioned below the label and is covered thereby.

The present invention can be used in a labeling machine for joining together two or more webs from separate rolls to form a continuous feed of label

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material to the machine. Alternately, the present invention can be used to join a series of webs together to form a single roll or spool of label material. The spliced roll of label material can then be used with a conventional labeling machine to apply the spliced labels to products.

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### **Brief Description of the Drawings**

For the purpose of illustrating the invention, there is shown in the drawings a form which is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

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Figure 1 is an isometric view of a container with a label surrounding the perimeter of the container, the label including a heat shrinkable splice as contemplated by the present invention.

Figure 2 is an isometric view of abutting ends of two label rolls connected by the shrinkable splice of the present invention.

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Figure 3 is a partial cross sectional view of a container having the heat shrinkable label and splice combination as contemplated by the present invention and as taken along line 3-3 in Figure 1.

Figure 4 is a partial cross sectional view of the container, heat shrinkable label and splice combination as taken along line 4-4 in Figure 1.

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### **Detailed Description of the Drawings**

In the drawings, where like numerals identify like elements, there is shown a container which is generally referred to by the numeral 10. In Figure 1, the container 10 is a generally cylindrical can which is contemplated to have a removable lid or cap. The container 10 has a heat shrunk label 12 thereon. The label 12 is formed such that the edge 14 wraps over the top edge of the container 10. In addition, a series of perforations 16 are provided such that the top portion of the label 12 may be separated from the bottom portion when the lid of the container 10 is unscrewed from the base of the container. As illustrated in phantom in Figure 1, a splice 18 is provided under the label for joining two ends

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20, 22 of label material.

The formation of the splice 18 is more particularly illustrated in Figure 2. The edges of the two ends 20, 22 of label material are positioned in an abutting relationship. Alternatively, there may be some overlap and the edges may be tacked or glued to one another. The splice 18 is positioned over the joint between the two ends of materials 20, 22 and is secured thereto by an adhesive 24 which is preferably formed on the rear surface of the splice material. The splice 18 secures the two ends 20, 22 of the label material and permits the attachment of the label material to the container in the manner described above.

After the label 12 is heat shrunk onto the container 10, the splice 18 is located inside of the label, underneath the ends 20, 22 of the abutting edges of the two rolls of material. Alternatively, the splice could be positioned over the printing (not shown) on the label 12 and, when the label material is wrapped around the container, positioned on the outside of the label. For this reason, the splice material is preferably clear or transparent so that the printing is not obliterated. A transparent splice also matches transparent labels, whether on the inside or the outside of the butt joint.

Another aspect of the invention is the use of a heat shrinkable material for the splice 18. This material will preferably have shrink characteristics that are similar (if not exact) to that of the label material. This shrink rate is preferably compatible in both the longitudinal and lateral directions of the label material. A typical label material will be bidirectional in that it will have a greater shrink rate in the longitudinal direction (see arrow 26 in Figure 2) than in the lateral direction (arrow 28 in Figure 2). The splice will be formed such that it is positioned transverse to the label. The longitudinal or lengthwise shrink rate of the splice will be preferably the same or similar to that of the lateral (28) shrink rate of the label material. Similarly, the shrink rate of the splice in its lateral or width-wise direction will be similar to that in the longitudinal (26) direction of the label. These properties for the splice will create relatively even shrinkage of the label when the heat is applied, and thus limit or prevent distortion of the printing on the label and/or tearing, splitting or fatiguing due to irregular shrinkage of the two

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materials. As can be seen in Figures 3 and 4, the label 12 and the splice 18 conform to the contours of the sidewall 30 of the container 10. Because the splice also shrinks with the label, the conformance is relatively the same at the splice as it would be where the label material alone covers the contour.

5           Another contemplated feature of the present invention is the adhesive used in conjunction with the splice as well as the tear strength of the splice material. Typically, the splice is formed on a roll with adhesive on one surface thereof and a release liner covering the adhesive. In order for the operation of the label machine to be substantially continuous, the splice must be created  
10 quickly. This requires the splice material to be unrolled from the roll, removed from the release liner, and adhered to the abutting edges of the label material at a relatively high rate of speed. Sufficient tensile strength must be provided in the lengthwise direction of the splice material. Also, the adhesive must have sufficient release qualities to permit this removal from the roll without undue resistance.

15           The splice material and adhesive must have sufficient strength to secure the two ends of the label material together as it is pulled into the labeling machine and as it is applied to the container. Also, the adhesive must be able to withstand the heat applied to the label and splice during shrinking of the label onto the container. If the adhesive were to degrade excessively under heat or tension,  
20 the splice could become undone. Further, the adhesive must allow the splice and label to shrink. It is contemplated that the relative rate of shrinkage may not be the same (i.e., one may shrink at a greater rate), although the overall shrinkage percentage may be compatible in the final condition (i.e., when the two reach final condition, they have shrunk relatively the same amount).

25           With these parameters in mind, certain materials have been identified to create the combined heat shrinkable label and splice as contemplated by the present invention. The label material may be a shrinkable polypropylene film such as Vision® 370C or 345C from AET Packaging Film of Wilmington, DE. Alternatively, the label may be made from a laminate of the 370C film in  
30 conjunction with a Vision® 370W type film with a two part urethane coating. Other commercial shrinkable labels or materials are also known and may be

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utilized for the present invention.

The material of the splice is preferably a clear, flexible, high shrinkage film with an aggressive adhesive coating. The aggressive adhesive is preferably selected to have a high range of tack (based on testing according to  
5 ASTM D 2979-71) between about 300 gm/cm<sup>2</sup> and about 600 gm/cm<sup>2</sup>. Preferably, the aggressive adhesive has a tack of about 450 gm/cm<sup>2</sup>. A top coat on the film layer may be included if the splice is to have printing or coloring disposed on it.

One suitable splice material that is available on the market is SECUREcal™ EXPE-400-FC Shrink which is manufactured by the Flexcon  
10 Company, Inc. This material includes a polyethylene film layer with a TC-391 top coating, a V-23 adhesive and is provided on a 44 PP-8 poly coated natural kraft release liner. The V-23 adhesive is a permanent pressure sensitive acrylic adhesive with a tack within the above preferred ranges. The adhesive layer is about 1.0 to 1.1 mils thick. The film layer is approximately 4 mils thick. The liner is about 3.1  
15 mils thick. This material has the desired relative shrink ratios and has been found through testing to be compatible with the label materials identified above, and for this reason is presently preferred. The adhesive is capable of withstanding the stresses exerted on the adhesive by the heat shrinking of the abutted labels. The adhesive also resists degradation.

20 An another splice material which can be used in the present invention is SECUREcal™ DEV-200-C Shrink which is also manufactured by the Flexcon Company, Inc. This splice material includes a clear vinyl film layer with a TC-248 top coating, a V-23 adhesive and a 44 PP-8 poly coated natural Kraft release liner. The adhesive layer is about 1.0 to 1.1 mils thick. The film layer is  
25 approximately 2 mils thick. The liner is about 3.1 mils thick.

Based on the teachings provided herein, persons skilled in the art would be readily capable of substituting other types of splice material for the above preferred materials.

While the present invention has been described as applicable for  
30 splicing two rolls of label material together, it is also contemplated that the present invention can be used to attach multiple webs of label material together to form a

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single roll. In this embodiment, the present invention would be used by a label manufacturer to splice a series of webs of label material together. The spliced label material would then be wound onto a roll for subsequent use in a labeling machine.

5                   As with conventional splices for attaching multiple rolls in labeling machines, conventional splices for attaching multiple webs on a single roll must be brightly colored. The bright coloring of the conventional splice permits the splice to be visually detected so that the splice can be skipped prior to application to a product, or a product which contains the splice can be removed by the operator  
10 prior to shipment. The present invention addresses this problem with conventional systems by using a transparent heat-shrinkable splice to form a roll of continuous label material from a series of shorter label webs.

                  The present invention solves the problems of the prior art systems by eliminating the need to detect splices within a label. As a result, the present  
15 invention greatly increases the production efficiency of a labeling process.

                  The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification, as indicating the scope of the invention.